

9-1
Multiplication and Division
of
Rational Expressions

Simplify:

$$\frac{3y(y+7)}{(y+7)(y^2-9)}$$

$$y \neq -7, \pm 3$$

$$\frac{3y}{(y-3)(y+3)} \text{ or } \frac{3y}{y^2-9} \quad y \neq -7, \pm 3$$

Simplify:

$$\frac{a^4b - 2a^4}{2a^3 - a^3b}$$

$$\frac{a^4(b-2)}{a^3(2-b)} = -a \quad \begin{matrix} b \neq 2 \\ a \neq 0 \end{matrix}$$

Simplify:

$$\frac{x^2 + 2x - 3}{x^2 - 2x - 15}$$

$$\frac{(x+3)(x-1)}{(x-5)(x+3)} = \frac{x-1}{x-5} \quad x \neq 5, -3$$

Multiplication and Division

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd} \quad \begin{matrix} b \neq 0 \\ d \neq 0 \end{matrix}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc} \quad \begin{matrix} b \neq 0 \\ c \neq 0 \\ d \neq 0 \end{matrix}$$

$$\frac{18x}{21y^3} \cdot \frac{7y^2}{16x^2} = \frac{1}{6x^2y}$$

$$x \neq 0, y \neq 0$$

$$\frac{5a^4c}{12b} \cdot \frac{24bc^2}{15a^3b^2}$$

$$\frac{10ps^2}{3c^2d} \div \frac{5ps}{6c^2d^2}$$

$$\frac{10ps^2}{3c^2d} \cdot \frac{6c^2d^2}{5ps} = 4sd$$

$$\begin{array}{l} c \neq 0 \\ d \neq 0 \\ p \neq 0 \\ s \neq 0 \end{array}$$

$$\frac{a^3 - b^3}{a^2 - b^2} \cdot \frac{(a+b)^2}{a^3 + b^3}$$

$a^2 \neq b^2$
 $a^3 \neq -b^3$

$$\frac{\cancel{(a-b)}(a^2+ab+b^2)}{\cancel{(a+b)}\cancel{(a-b)}} \cdot \frac{\cancel{(a+b)}\cancel{(a+b)}}{\cancel{(a+b)}(a^2-ab+b^2)}$$

$$\frac{a^2+ab+b^2}{a^2-ab+b^2}$$

$$\frac{k-3}{k+1} \div \frac{(k-1)(k-3)}{(1-k)(1+k)}$$

$$\frac{\cancel{(k-3)}}{\cancel{(k+1)}} \cdot \frac{\cancel{(1-k)}\cancel{(1+k)}}{\cancel{(k-1)}\cancel{(k-3)}}$$

$$\frac{1}{1-k} = -1$$

$$k \neq \pm 1, 3$$

Complex Fraction--rational expression with rational expression in numerator or denominator

$$\frac{\frac{x^2}{(9x^2 - 4y^2)}}{x^3}$$

$$\frac{x^2}{2y-3x}$$

$$\frac{x^2}{(3x+2y)(3x-2y)} \cdot \frac{-1(2y-3x)}{x^3}$$

$$= \frac{-1}{x(3x+2y)}$$

$x \neq 0$
 $3x \neq \pm 2y$

HW
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